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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 03/28/2008 / Priority: 1. Electronic engineering / 2. Chemistry / 3. JIS (Japan Industrial Standards) term

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**FULL CONTENTS**

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**[Claim(s)]**

[Claim 1] The bronze alloy which is characterized by being 0.35 to 1.2% of Se, less than Sb0.25%, and 0.1 to 1.0% of Mg P 0.05% or less by a bulk density as for 85 to 88% of Cu, less than Pb1%, 4 to 6% of Zn, 0.5 to 2.5% of Bi, and 4 to 6% of Sn.

[Claim 2] The bronze alloy which is characterized by being 0.35 to 1.2% of Se, less than Sb0.25%, 0.1 to 1.0% of Mg, and 0.05 to 0.2% of a misch metal P 0.05% or less by a bulk density as for 85 to 88% of Cu, less than Pb1%, 4 to 6% of Zn, 0.5 to 2.5% of Bi, and 4 to 6% of Sn.

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This copper alloy is used for the water-contacting metal fittings for common piping instruments, water supply system equipment, the other cock metal-fittings and equipment metallurgy implement for waterworks, etc. about a bronze alloy, for example, characteristics of this invention, such as corrosion resistance, machinability, resistance to pressure, soundness, and printing-proof nature, are good, and it is related with a bronze alloy gentle also to water quality.

**[0002]**

[Description of the Prior Art] Generally, a bronze cast (CAC406 (BC6)) is excellent in fluidity, corrosion resistance, machinability, and resistance to pressure, and since its fluidity at the time of melting is good and it fits to some extent complicated-shaped cast parts, they are used from before. [ to common piping instruments, such as a bulb, a cock, and a joint, etc. ] [ many ]

[0003] Since these CAC406 (BC6) are called what is called 85-5-5-5 alloy (85%Cu, 5%Sn, 5%Pb, 5%Zn), a healthy casting is easy to be obtained and Pb is moreover contained 5% Since machinability of a mechanical property is good especially good, the present condition is mostly used to the water-contacting metal fittings for this kind of piping instruments.

[0004] Where high temperature hot water is touched especially, when it used this bronze alloy for the material of water-contacting metal fittings, such as a bulb, or these water-contacting metal fittings are used, The lead contained without almost dissolving to a bronze cast is eluted underwater, water quality is worsened, and especially, since the water containing lead will be drunk, it is not desirable to use this kind of alloy for the piping instrument of drinking water and the apparatus for water-works pipes. It is tended further strictly therefore, for it to be in the tendency to decide the elution fiducial point with which lead from a piping instrument to [ from the consideration on environmental preservation ] water is eluted, and to decide this fiducial point these days.

[0005] By the way, in order to prevent this kind of air pollution based on lead particles, lead is replaced by Se and Bi and the bronze cast which lessened leaden content is proposed. This bronze cast shall be called SEBIROI <1> (SeBiLOY <1>) (trademark) and SEBIROI <2> (SeBiLOY <2>) (trademark) as shown below, and this copper alloy shall have cleared the predetermined lead elution standard (refer to U.S. Pat. No. 5614038 gazette).

**[0006]****[Table 1]**

成 分	SeBiLOY<1>(%)	SeBiLOY<2>(%)
Cu	86.0-88.0	85.0-87.0
Fe	0.30	0.30
Pb	0.25	0.25
Ni	1.0	1.0
Zn	4.0-6.0	4.0-6.0
Bi	0.5-1.5	1.5-2.5
Sn	4.0-6.0	4.0-6.0
P	0.05	0.05
Se	0.35-0.7	0.8-1.2
Sb	0.25	0.25
S	0.08	0.08
Al	0.005	0.005
Si	0.005	0.005

[0007] [ 2 ] as this SEBIROI <1> and <2> are shown in Table 1, while stopping leaden content to 0.25% or less He prevents eluting lead and is trying to meet the lead elution standard by changing into the state where Se (compound) and Bi enclose lead (Pb), as Bi and Se are added and it is shown in the schematic diagram of the form of organization of drawing 2 .

[0008]

[Problem to be solved by the invention] As for this kind of copper alloy, it is desirable to use abundantly and manufacture recycling material based on effective use of resources or consideration of environment. however, [ most recycling material which is circulating now ] Since lead contains, when SEBIROI <1> and <2> which are a Cu-Zn-Sn-Bi-Se system bronze alloy are manufactured using recycling material, adjusting leaden content so that the default of SEBIROI may be suited has forced very difficult and difficult work.

[0009] [ the place which results in development and is wholeheartedly made into the purpose as a result of research in order that this invention may obtain a copper alloy gentle also to saving-resources-izing and water quality in view of the conventional actual condition ] Even if it changes leaden content somewhat by the quality of the raw material used for the copper alloy which contained Se, Bi, etc. as a leaden substitution material, it is in offering the bronze cast with which it is satisfied of a predetermined lead elution standard.

[0010]

[Means for solving problem] Invention in Claim 1 is a bronze alloy which is a bulk density and are P 0.05% or less and 0.35 to 1.2% of Se of 85 to 88% of Cu, less than Pb1%, 4 to 6% of Zn, 0.5 to 2.5% of Bi, and Sn [ 4 to 6% of ], less than Sb0.25%, and 0.1 to 1.0% of Mg.

[0011] Invention in Claim 2 is a bulk density. They are P 0.05% or less and 0.35 to 1.2% of Se of 85 to 88% of Cu, less than Pb1%, 4 to 6% of Zn, 0.5 to 2.5% of Bi, and Sn [ 4 to 6% of ], less than Sb0.25%, 0.1 to 1.0% of Mg, and the bronze alloy that is 0.05 to 0.2% of a misch metal.

[0012]

[Mode for carrying out the invention] The embodiment of a bronze alloy excellent in the corrosion resistance in this invention is explained. This bronze alloy is a rate of a bulk density, Zn considered it as 4 to 6% by Cu having considered it as 85 to 88%, Sn made 4 to 6% the main ingredients, and the form containing the constituent element mentioned later is used for it.

[0013] Although Mg of invention in Claim 1 dissolves in small quantities in SEBIROI <1> and the Cu-Zn-Sn-Bi-Se system bronze alloy represented by <2>, the most forms independence or a compound in a grain boundary and a grain, and it exists. On the other hand, since lead has the degree of dissolution of Mg and some, in addition to becoming chemical more stable, Mg and Mg compound deposit in the form which encloses lead (refer to the schematic diagram of the form of organization of drawing 1 ). Moreover, since this Mg and Mg compound serve as a form which encloses further Se (compound) which enclosed lead, and Bi, they can prevent leaden elution doubly by surrounding lead directly or indirectly. Therefore, according to this invention, even if it makes lead increase to a certain quantity, the leaden amount of elution can be controlled low. Having made the maximum of Mg into 1 weight % takes the fluidity in an actual alloy into consideration.

[0014] The misch metal of invention in Claim 2 is set in said component range. By adding rare-earth-elements mixtures, such as Fe0.44%, to a bronze alloy Ce54%, La23.2%, Nd16.8%, Pr6%, Sm0.03%, and Al0.05% While leaden distribution equalization and a leaden miniaturization are made and being able to control leaden elution, it is possible by forming a detailed intermetallic compound to also raise machinability. The upper limit of the content of a misch metal was made into 0.2 weight % because change was not accepted even if the dispersion effect of lead by adding a misch metal adds the quantity beyond it. On the other hand, the lower limit was made into 0.05 weight % because a clear effect was not accepted in lead elution prevention in the quantity not more than it.

[0015] Zn becomes suitable for the metal fittings excellent in fluidity for piping instruments by considering it as 4 to 6% by Sn considering it as 4 to 6 weight % for improvement in an increase and abrasion resistance of intensity and hardness, and corrosion resistance.

[0016] Pb is contained 1.0 or less weight %. Even if this component is the case where lead is eluted underwater, it is the range which can stop the amount of elution of that lead low, and is the range which made it possible to also raise machinability, printing-proof nature, and resistance to pressure from conventional SEBIROI <1> and the bronze alloy of <2> by containing Pb in this component range. When using recycling material abundantly and manufacturing a copper alloy especially, it is also the range contained actually.

[0017] Moreover, P is added 0.05 or less weight %. There is work which raises abrasion resistance more by P's functioning as a deoxidizer at the time of casting, raising fluidity, being connected with Cu, and forming the intermetallic compound of Cu<sub>3</sub>P.

[0018] Bi is added 0.5 to 2.5weight %. Bi is the constituent element which is harmless also as drinking water and can raise machinability and printing-proof nature, without almost dissolving to Cu, Sn, and Zn which are the bronze main ingredients. If the above-mentioned function of Bi does not demonstrate that the Reason for having made Bi into this addition ingredient range is less than 0.5% but 2.5% is exceeded, the amount of crystallization of Bi will increase and mechanical strength will fall.

[0019] Se is added 0.35 to 1.2weight %. This Se forms Zn, Cn, and an intermetallic compound in an alloy, and it is effective in raising machinability. Moreover, since ZnSe and a Cu<sub>2</sub>Se compound are insoluble in water, they have prevented elution of Se.

[0020]

[Working example] The work example of the bronze alloy which was excellent in the corrosion resistance in this invention below is explained in full detail. As an example, it examined about the alloy which added Mg, and Mg and the alloy which added the misch metal based on the Cu-Zn-Sn-Bi-Se system bronze alloy (SEBIROI <2>). The composition of an alloy made into the test specimen is shown in Table 2. Here, the series of a test specimen A adds lead about 0.5weight % to said Cu-Zn-Sn-Bi-Se system bronze alloy.

[0021]

[Table 2]

Bal: 残余										
供試材	Cu	Zn	Sn	Pb	Bi	Se	P	Sb	Mg	MMetal
A-0	Bal	5.31	5.31	0.51	1.92	0.89	0.02	0.04	0	0
A-1	Bal	5.47	5.21	0.47	1.84	0.84	0.01	0.03	0.31	0
A-2	Bal	5.50	5.34	0.48	1.86	0.88	0.01	0.05	0.58	0
A-3	Bal	5.49	5.31	0.50	1.91	0.91	0.02	0.03	0.29	0.19
A-4	Bal	5.52	5.40	0.49	1.97	0.94	0.02	0.04	0.60	0.20
B-0	Bal	5.51	5.40	1.19	1.94	0.90	0.01	0.04	0	0
B-1	Bal	5.40	5.38	1.22	1.90	0.88	0.01	0.03	0.29	0
B-2	Bal	5.46	5.39	1.20	1.88	0.89	0.01	0.04	0.60	0
B-3	Bal	5.37	5.42	1.24	1.91	0.90	0.02	0.04	0.31	0.19
B-4	Bal	5.57	5.30	1.17	1.86	0.86	0.01	0.04	0.61	0.19

[0022] The test specimen A-0 is not making Mg or a misch metal contain as a material for comparing with other test specimens concerning this invention. The alloy concerning this invention to which the \*\*\*\*\* material A-1 and A-2 added Mg to the test specimen A-0, a test specimen A-3, and A-4 are the alloys concerning this invention which added Mg and a misch metal to the test specimen A-0.

[0023] It dissolved by combination of Table 2 with the high frequency fusion furnace in the atmosphere, and with the sandmold mold, after casting, each test specimen was all processed and created four pillars of phi50x60 each for every test specimen. It is JIS about this cylindrical test specimen. It examined based on the transduatory ability examining method by S3200-7. The result is shown in drawing 3.

[0024] The amount of lead extraction of a test specimen A-0 is 0.015 mg/L. Like this invention, this means satisfying the present lead elution standard (for example, 0.05 or less mg/L), if leaden content is about 0.5 weight % even if it does not make Mg or a misch metal contain. However, this value cannot satisfy the lead elution standard (for example, 0.01 or less mg/L) currently guided by Ministry of Health and Welfare as a desired value, for example.

[0025] The test specimen A-1 is making Mg contain 0.31weight %, and the amount of lead elution is 0.007 mg/L. The test specimen A-2 is making Mg contain 0.58weight %, and the amount of lead extraction is 0.006 mg/L. Therefore, meeting the lead elution standard currently guided by Ministry of Health and Welfare as a desired value is checked by adding Mg.

[0026] A test specimen A-3 makes Mg contain 0.29weight %, the misch metal is contained further 0.19weight %, and the amount of lead extraction is 0.006 mg/L. A test specimen A-4 makes Mg contain 0.60weight %, the misch metal is contained further 0.20weight %, and the amount of lead extraction is 0.004 mg/L. Therefore, in addition to Mg, the severe lead elution standard can be further met more effectively by adding a misch metal.

[0027] The series of a test specimen B adds lead about 1.2weight % to a Cu-Zn-Sn-Bi-Se system bronze alloy (SEBIROI <2>).

[0028] The test specimen B-0 is not making Mg or a misch metal contain as a material for comparing with other test specimens. The alloy with which a test specimen B-1 and B-2 added Mg to the test specimen B-0, a test specimen B-3, and B-4 are the alloys which added Mg and a misch metal to the test specimen B-0.

[0029] The manufacture method of each test specimen, form, and an extraction test method are the same as that of the test specimen of A series. The result is shown in drawing 3.

[0030] The amount of lead extraction of a test specimen B-0 is 0.022 mg/L. Like this invention, this means satisfying the present lead elution standard (0.05 or less mg/L), if leaden content is about 1.2 weight % even if it does not make Mg or a misch metal contain. However, it cannot

be satisfied with this of the lead elution standard (0.01 or less mg/L) currently guided by Ministry of Health and Welfare as a desired value.

[0031] The test specimen B-1 is making Mg contain 0.29weight %, and the amount of lead extraction is 0.013 mg/L. The test specimen B-2 is making Mg contain 0.60weight %, and the amount of lead extraction is 0.011 mg/L. Therefore, although it is accepted that the leaden amount of extraction becomes less by adding Mg like the test specimen of A series which contains lead about 0.5weight %, by the time it meets the lead elution standard currently guided by Ministry of Health and Welfare, it will not have resulted.

[0032] A test specimen B-3 makes Mg contain 0.31weight %, the misch metal is contained further 0.19weight %, and the amount of lead extraction is 0.011 mg/L. A test specimen B-4 makes Mg contain 0.61weight %, the misch metal is contained further 0.19weight %, and the amount of lead extraction is 0.011 mg/L. Therefore, although it is admitted that it can become same to add a misch metal further in addition to Mg the cause which reduces the leaden amount of extraction further in the test specimen of A series which contains lead about 0.5weight %, by the time it meets the lead elution standard currently guided by Ministry of Health and Welfare as a desired value, it will not have resulted.

[0033] making the component range of lead in this invention into 1 or less weight % from the above-mentioned test result -- this range -- be -- [ with addition of \*\* Mg and a misch metal ] The severe lead elution standard can be met also in the bronze alloy containing Se represented by the Cu-Zn-Sn-Bi-Se system bronze alloy (SEBIROI <1>, <2>), Bi, etc.

[0034] Although it has controlled the leaden amount of elution by adding Mg, even if this invention adds Ca, it is effective. The sum total of one side of Mg and Ca or both sides of this component range should just be 0.1 to 1.0 weight %. Ca forms lead and a compound phase like Mg, and exhibits the function to prevent leaden elution.

[0035] In addition, although this invention has controlled the leaden amount of elution by adding a misch metal combining Mg, it may add only a misch metal 0.05 to 0.2weight %, and can reduce leaden elution even in this case.

[0036] [ the work example ] although the above-mentioned work example is applied to piping instruments, such as valve member articles, such as a bulb for drinking water, a stem, a valve seat, and JISUKU, a cock, and a joint, and the apparatus for water-works pipes In addition, parts, such as warm water associated equipment, such as instruments, such as a strainer which \*\*\*\*, a pump, and a motor, or cock metal fittings which \*\*\*\*, and also a water heater machine, and a waterworks line, a member, etc. are further used for intermediate items in addition to the above-mentioned final product, an assembly, etc., such as a coil and a hollow stick, widely.

[0037]

[Effect of the Invention] While Se and Bi adhere to lead according to this invention so that clearly from the above thing Since leaden elution is doubly prevented by wrapping these in Mg or Mg, and a misch metal further, In manufacture of the conventional copper alloy which contained Se, Bi, etc. as a leaden substitution material, even if it changes leaden content somewhat by the quality of raw material, the effect which was [ offer / the bronze cast with which it is satisfied of a severe lead elution standard ] excellent is done so.

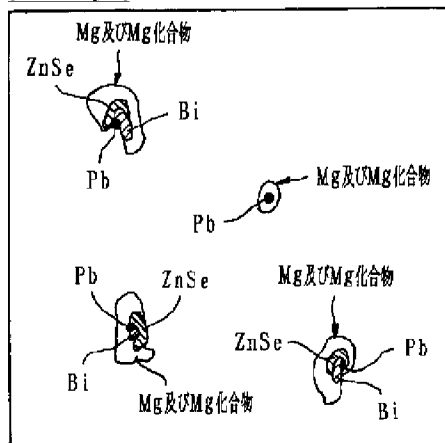
#### [Brief Description of the Drawings]

[Drawing 1] It is the schematic diagram having shown the form of organization (x400) of the bronze alloy in this invention.

[Drawing 2] It is the schematic diagram of the form of organization (x400) of the Cu-Zn-Sn-Bi-Se system bronze alloy in which conventional parallel was shown.

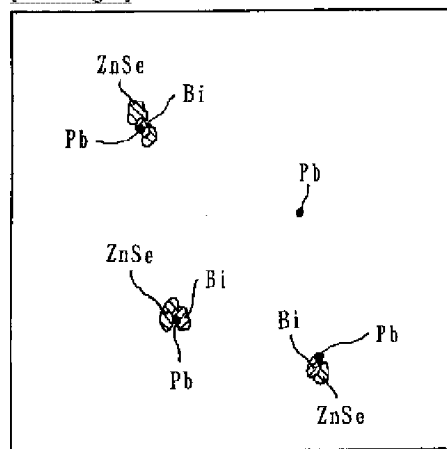
[Drawing 3] It is the graph in which the lead extraction test result in this invention was shown.

[Drawing 1]



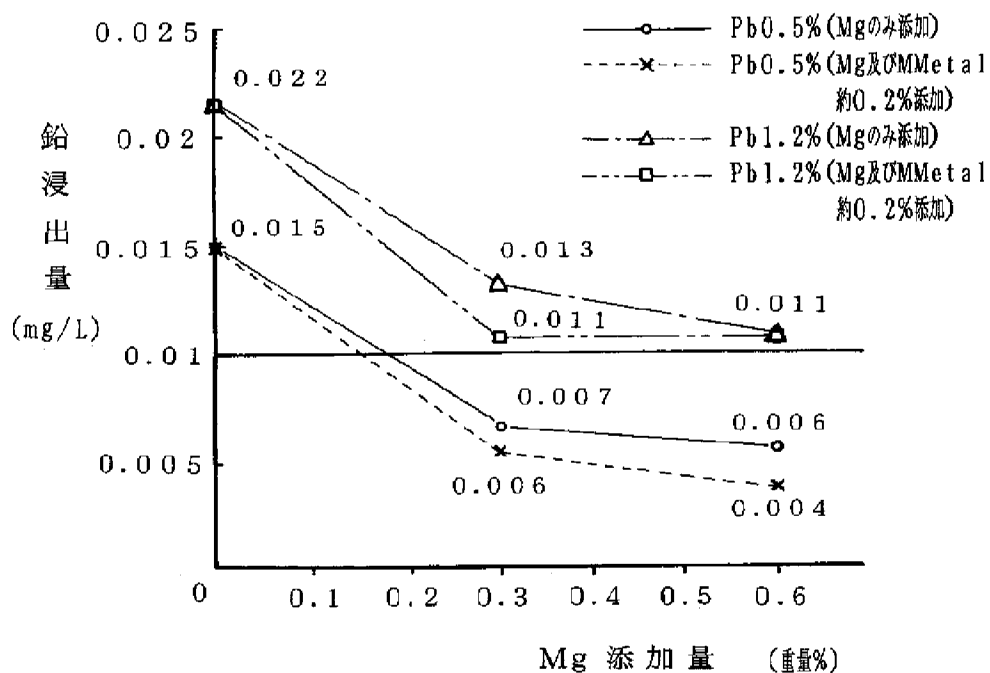
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[Drawing 2]



(× 400)

[Drawing 3]



[Translation done.]